

CLAIMS

1. A thermosetting resin composition comprising at least a polyimide resin component (A) containing at least one polyimide resin, a phenol resin component (B) containing at least one phenol resin, and an epoxy resin component (C) containing at least one epoxy resin, wherein the mixing ratio by weight $(A)/[(B)+(C)]$ is in a range of 0.4 to 2.0, the mixing ratio by weight being the ratio of the weight of the polyimide resin component (A) to the total weight of the phenol resin component (B) and the epoxy resin component (C).

2. The thermosetting resin composition according to Claim 1, wherein the mixing ratio by mole $(B)/(C)$ is in a range of 0.4 to 1.2, the mixing ratio by mole being the ratio of the number of moles of the hydroxyl group of the phenol resin contained in the phenol resin component (B) to the number of moles of the epoxy group of the epoxy resin contained in the epoxy resin component (C).

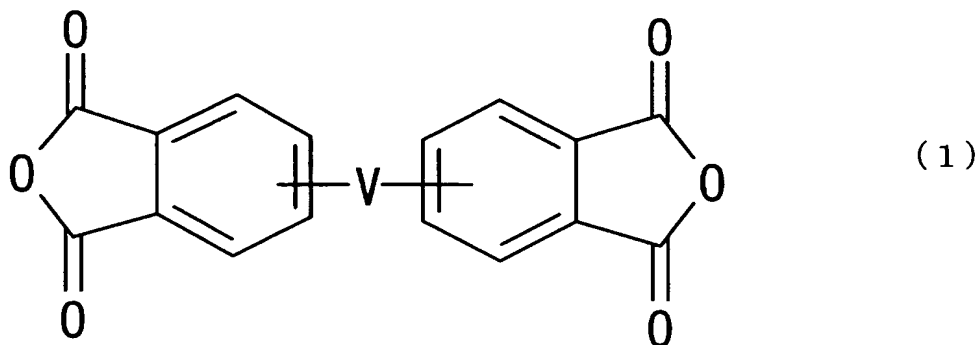
3. The thermosetting resin composition according to Claim 1 or 2, wherein the polyimide resin (A) contains a soluble polyimide resin.

4. The thermosetting resin composition according to Claim 3, wherein the polyimide resin (A) dissolves in an amount of 1% by weight or more in at least one organic solvent selected from the group consisting of dioxolane, dioxane, tetrahydrofuran, N,N-dimethylformamide, N,N-

dimethylacetamide, and N-methyl-2-pyrrolidone in a temperature range of 15°C to 100°C.

5. The thermosetting resin composition according to Claim 3 or 4, wherein the polyimide resin (A) contains at least one component for imparting organic solvent solubility which is selected from the group consisting of an aliphatic compound component, an alicyclic compound component, and a bisphenol compound-alkylene oxide adduct component, so as to exhibit solubility in a mixed solvent containing a low-boiling organic solvent.

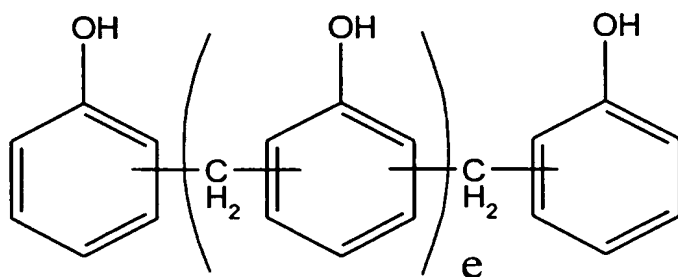
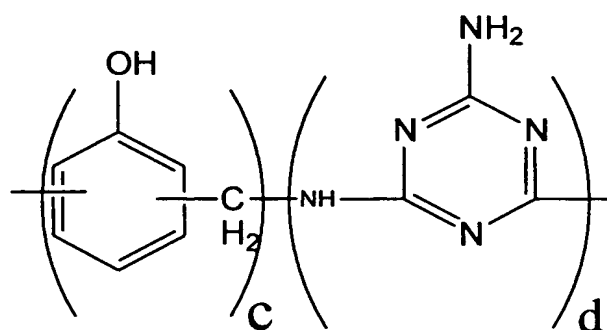
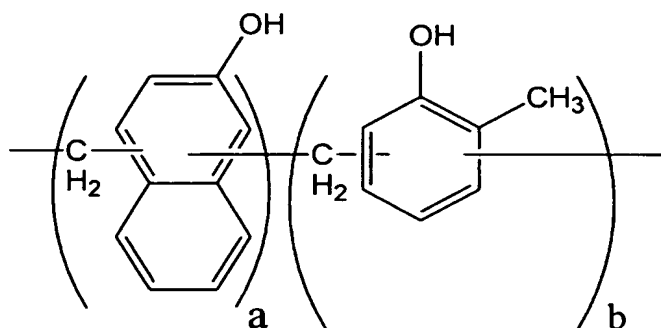
6. The thermosetting resin composition according to any one of Claims 1 to 5, wherein the polyimide resin (A) is produced by reacting an acid dianhydride component with a diamine component or an isocyanate component, and the acid dianhydride component contains at least an acid dianhydride represented by general formula (1):



(wherein V represents a direct bond, -O-, -O-T-O-, -O-CO-T-CO-O-, -(C=O)-, -C(CF₃)₂-, or -C(CH₃)₂-, T representing a divalent organic group).

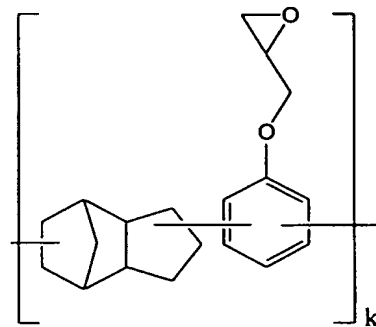
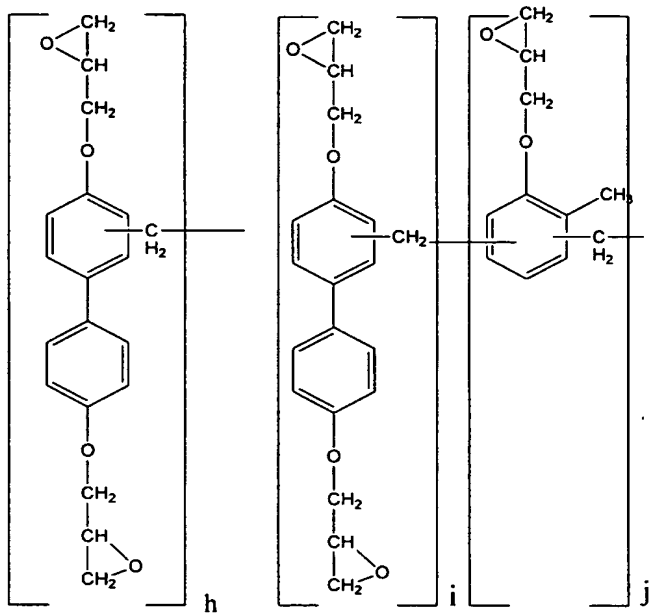
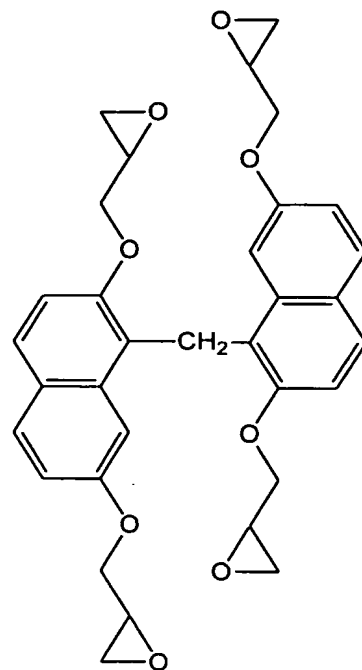
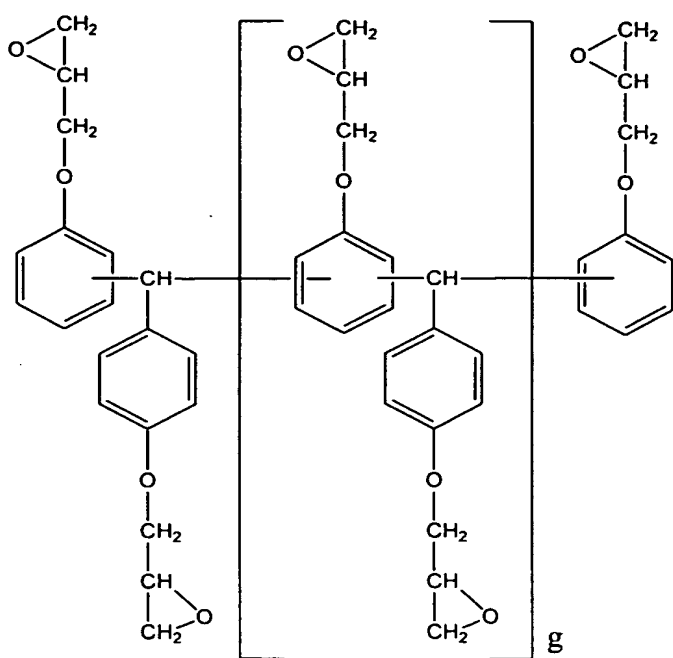
7. The thermosetting resin composition according to any one of Claims 1 to 6, wherein the polyimide resin (A) is produced by reacting an acid dianhydride component with a diamine component or an isocyanate component, and the
5 diamine component or the isocyanate component contains at least any one of a siloxane diamine, a diamine containing a hydroxyl group and/or a carboxyl group, a diamine having amino groups at the meta positions, a diamine having amino groups at the ortho positions, an isocyanate having an amino
10 group at the meta position, and an isocyanate having an amino group at the ortho position.

8. The thermosetting resin composition according to any one of Claims 1 to 7, wherein the phenol resin component (B) contains at least one phenol resin selected from the group
15 consisting of compounds having structures represented by the formulae:



(wherein a, b, c, d, and e each represent an integer of 1 to 10).

9. The thermosetting resin composition according to any one of Claims 1 to 8, wherein the epoxy resin component (C) contains at least one epoxy resin selected from the group consisting of compounds having structures represented by the formulae:



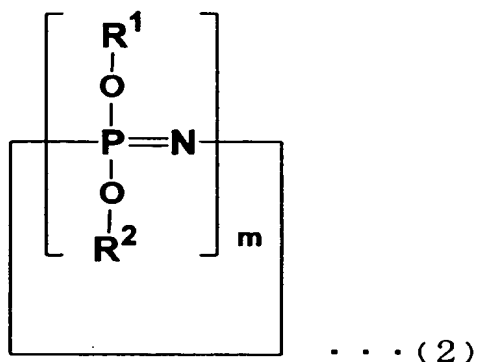
(wherein g, h, i, j, and k each represent an integer of 1 to

10).

10. A thermosetting resin composition comprising at least a polyimide resin (A) containing at least one polyimide resin, a phosphazene compound (D) containing at least one phosphazene compound, and a cyanate ester compound (E) containing at least one cyanate ester compound, wherein the phosphazene compound (D) comprises a phenolic hydroxyl group-containing phenoxyphosphazene compound (D-1) and/or a crosslinked phenoxyphosphazene compound (D-2) prepared by crosslinking the phenoxyphosphazene compound (D-1), the crosslinked phenoxyphosphazene compound (D-2) having at least one phenolic hydroxyl group.

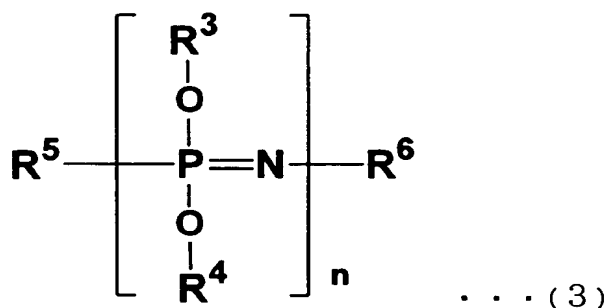
11. The thermosetting resin composition according to Claim 10, wherein the mixing ratio by weight $(D)/[(A)+(D)+(E)]$ is in a range of 0.01 to 0.4, the mixing ratio by weight being the ratio of the weight of the phosphazene compound (D) to the total weight of the polyimide resin (A), the phosphazene compound (D), and the cyanate ester compound (E).

12. The thermosetting resin composition according to Claim 10 or 11, wherein the phenoxyphosphazene compound (D-1) comprises at least a cyclic phenoxyphosphazene compound (D-11) represented by general formula (2):



(wherein m represents an integer of 3 to 25; R¹ and R² each represent a phenyl group or a hydroxyphenyl group; and at least one hydroxyphenyl group is contained per molecule)

5 and/or a linear phenoxyphosphazene compound (D-12) represented by general formula (3):



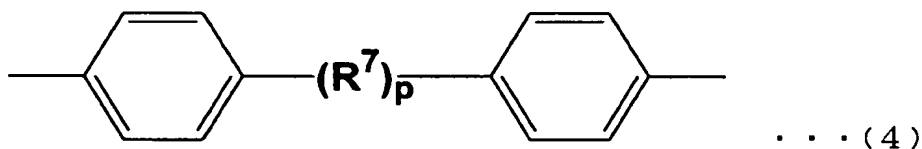
(wherein n represents an integer of 3 to 10,000; R³ and R⁴ each represent a phenyl group or a hydroxyphenyl group; at least one hydroxyphenyl group is contained per molecule; R⁵ represents -N=P(OC₆H₅)₃, -N=P(OC₆H₅)₂(OC₆H₄OH),

-N=P(OC₆H₅)(OC₆H₄OH)₂, -N=P(OC₆H₄OH)₃, -N=P(O)OC₆H₅, or -N=P(O)(OC₆H₄OH); and R⁶ represents -P(OC₆H₅)₄,

15 -P(OC₆H₅)₃(OC₆H₄OH), -P(OC₆H₅)₂(OC₆H₄OH)₂, -P(OC₆H₅)(OC₆H₄OH)₃,

$-P(OC_6H_4OH)_4$, $-P(O)(OC_6H_5)_2$, $-P(O)(OC_6H_5)(OC_6H_4OH)$, or
 $-P(O)(OC_6H_4OH)_2$.

13. The thermosetting resin composition according to any
 one of Claims 10 to 12, wherein the crosslinked
 5 phenoxyphosphazene compound (D-2) is prepared by
 crosslinking the phenoxyphosphazene compound (D-1) with a
 phenylene-based crosslinking group containing at least any
 one of an o-phenylene group, an m-phenylene group, a p-
 phenylene group, and a bisphenylene group represented by
 10 general formula (4):



(wherein R^7 represents $-C(CH_3)_2-$, $-SO_2-$, $-S-$, or $-O-$; and p
 represents 0 or 1).

14. The thermosetting resin composition according to
 15 Claim 12 or 13, wherein the crosslinked phenoxyphosphazene
 compound (D-2) is a phenylene-based crosslinked
 phenoxyphosphazene compound (D-21) having at least one
 phenolic hydroxyl group, in which the cyclic
 phenoxyphosphazene compound (D-11) and/or the linear
 20 phenoxyphosphazene compound (D-12) are used as the
 phenoxyphosphazene compound, and the phenylene-based
 crosslinking group lies between two oxygen atoms of the
 phenoxyphosphazene compound (D-1), the phenyl group and the

hydroxyphenyl group being separated from the oxygen atoms, and the content of the phenyl group and the hydroxyphenyl group in the crosslinked phenoxyphosphazene compound is in a range of 50% to 99.9% based on the total number of phenyl groups and hydroxyphenyl groups contained in the phenoxyphosphazene compound.

15. The thermosetting resin composition according to any one of Claims 10 to 14, wherein the polyimide resin (A) contains a soluble polyimide resin.

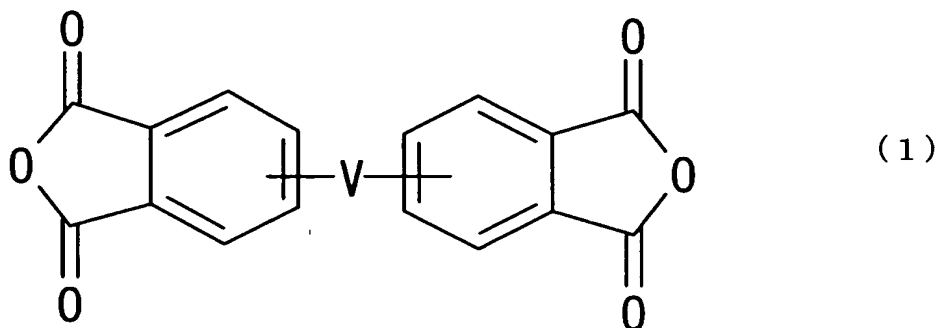
16. The thermosetting resin composition according to Claim 15, wherein the polyimide resin (A) dissolves in an amount of 1% by weight or more in at least one organic solvent selected from the group consisting of dioxolane, dioxane, tetrahydrofuran, N,N-dimethylformamide, N,N-dimethylacetamide, and N-methyl-2-pyrrolidone in a temperature range of 15°C to 100°C.

17. The thermosetting resin composition according to Claim 15 or 16, wherein the polyimide resin (A) contains at least one component for imparting organic solvent solubility which is selected from the group consisting of an aliphatic compound component, an alicyclic compound component, and a bisphenol compound-alkylene oxide adduct component, so as to exhibit solubility in a mixed solvent containing a low-boiling organic solvent.

18. The thermosetting resin composition according to any

one of Claims 10 to 17, wherein the polyimide resin (A) is produced by reacting an acid dianhydride component with a diamine component or an isocyanate component, and the acid dianhydride component contains at least an acid dianhydride

5 represented by general formula (1):



(wherein V represents a direct bond, -O-, -O-T-O-, -O-CO-T-CO-O-, -(C=O)-, -C(CF₃)₂-, or -C(CH₃)₂-, T

10 representing a divalent organic group).

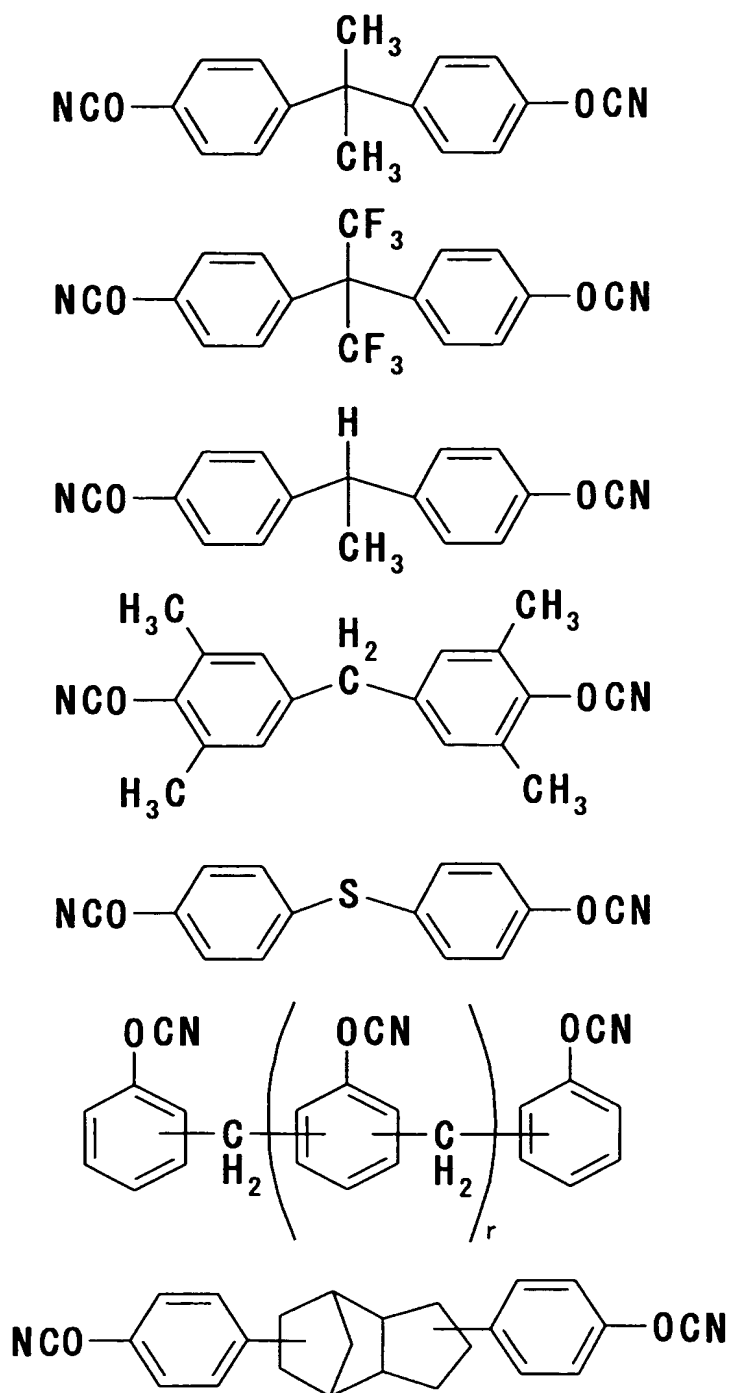
19. The thermosetting resin composition according to any one of Claims 10 to 18, wherein the polyimide resin (A) is produced by reacting an acid dianhydride component with a diamine component or an isocyanate component, and the

15 diamine component or the isocyanate component contains at least any one of a siloxane diamine, a diamine containing a hydroxyl group and/or a carboxyl group, a diamine having amino groups at the meta positions, a diamine having amino groups at the ortho positions, an isocyanate having an amino

20 group at the meta position, and an isocyanate having an

amino group at the ortho position.

20. The thermosetting resin composition according to any one of Claims 10 to 19, wherein the cyanate ester compound (E) includes at least one compound selected from the group
5 consisting of compounds represented by the group of general formulae (1):



• • • Group of general
formulae (1)

(wherein r represents 0 to 4).

21. A multilayer body comprising at least one resin layer formed of the thermosetting resin composition according to any one of Claims 1 to 20.

22. The multilayer body according to Claim 21, wherein
5 the multilayer body is used as a circuit board or a multilayer printed circuit board.

23. A circuit board comprising a cured object prepared from the thermosetting resin composition according to any one of Claims 1 to 20.